APPENDIX I

DREDGING

"BEST MANAGEMENT PRACTICES"[1]

1 Derived from the Hartman Consulting Group presentation *"How to Develop and Manage Successful Dredging Projects*, 13-14 November 1996.

APPENDIX I

BEST MANAGEMENT PRACTICES

Best Management Practices (BMP) are the actual practices--including the forms, procedures, charts, software references, etc.--actually used by dredgers to minimize consequences of dredging and disposal on water quality. Any good forester is concerned about these impacts. Measures can be taken to preserve soil and water quality and to prevent their undue mixing.

Common BMPs include Silt Curtains, Gunderbooms, and Operational Controls.

Silt Curtains

Silt curtains are intended to allow suspended sediment at a dredging site to settle out of the water column in a controlled area, minimizing the area that is affected by the increased suspended sediment usually present at a dredging site. A silt curtain is an impermeable barrier. They are constructed of a flexible reinforced thermoplastic material. The upper hem has floatation material and the lower hem has ballast material. Silt curtains are most effective when used on a project where they are not opened and closed to allow equipment access to the dredging or disposal area. Silt curtains are also limited to project locations with less than 1-2 knot currents.

Gunderbooms

Gunderbooms are designed to allow water to flow through the curtain while filtering suspended dredged sediment from the flow. Gunderbooms are similar to silt curtains but are constructed of permeable geotextile fabrics. They are also designed to extend from the water surface to the project bottom.

Mechanical Dredge Operational Controls

There are three fundamental controls possible with mechanical dredges.

- **Increase cycle time.** Longer cycle time reduces the velocity of the ascending loaded bucket through the water column, which reduces potential to wash sediment form the bucket.

However, limiting the velocity of the descending bucket reduces the volume of sediment that is picked up and requires more total bites to remove the project material. The majority of the sediment resuspension, for a clamshell dredge, occurs when the bucket hits the bottom.

- **Eliminate multiple bites.** When the clamshell bucket hits the bottom, an impact wave of suspended sediment travels along the bottom away form the dredge bucket. When the clamshell bucket takes multiple bites, the bucket loses sediment as it is reopened for subsequent bites. Sediment is also released higher in the water column, as the bucket is raised, opened, and lowered.

- **Eliminate bottom stockpiling.** Bottom stockpiling of the dredged sediment in silty sediment has a similar effect as multiple bite dredging; an increased volume of sediment is released into the water column from the operation.

Hydraulic Dredge Operational Controls

There are three fundamental controls possible with hydraulic dredges.

- **Reduce cutterhead rotation speed.** Reducing cutterhead rotation speed reduces the potential for side casting the excavated sediment away form the suction entrance and resuspending sediment. This measure is typically effective only on maintenance or relatively loose, fine grain sediment.

- **Reduce swing speed.** Reducing the swing speed ensures that the dredge head does not move through the cut faster than it can hydraulically pump the sediment. Reducing swing speed reduces the volume of resuspended sediment. The goal is to swing the dredge head at a speed that allows as much of the disturbed sediment as possible to be removed with the hydraulic flow. Typical swing speeds are 5-30 feet/minute.

- **Eliminate bank undercutting.** Dredgers should remove the sediment in maximum lifts equal to 80% or less of the cutterhead diameter.

Hopper Dredges and Barges Operational Controls

There are three controls possible with dredges and barges.

- **Eliminate or reduce hopper overflow.** Eliminating or reducing hopper overflow reduces the volume of fine material which flows from the hopper in the overflow. One caution is that this control may significantly reduce project production for hopper dredges or when hydraulic dredging into a barge.

- **Lower hopper fill level.** Lowering the hopper fill level in rough sea conditions can prevent material loss during transport.

- **Recirculation system.** Water from the hopper overflow can be recirculated to the draghead and is used to transport more material into the hopper.

SPECIALTY EQUIPMENT

- **Pneuma Pump.** The Pneuma pump is used primarily for removal of fine-grained sediment. The Pneuma pump offers high solids concentration (up to 90%) in the dredge slurry, with minimal turbidity.

- **Closed or environmental bucket.** Specially constructed dredging buckets designed to reduce or eliminate increased turbidity of suspended solids from entering a waterway.

- **Large capacity dredges.** Larger than normal dredges designed to carry larger loads. This allows less traffic and fewer dumps, thereby providing less disturbance at a disposal site.

- **Precision Dredging.** Dredging utilizing special tools and techniques to restrict the material dredged to that specifically identified. This may mean thin layers, either surficial or imbedded, or specific boundaries.

ENVIRONMENTAL WINDOWS

Environmental windows are periods of time when dredging activities (actual dredging or disposal) may take place without restriction because of special status species. It also includes certain prescribed techniques during time periods when special status species may be in the area or when dredging activities are prohibited because special status species are present.